



# **Materials Management and Climate Change**

## **An Introduction**

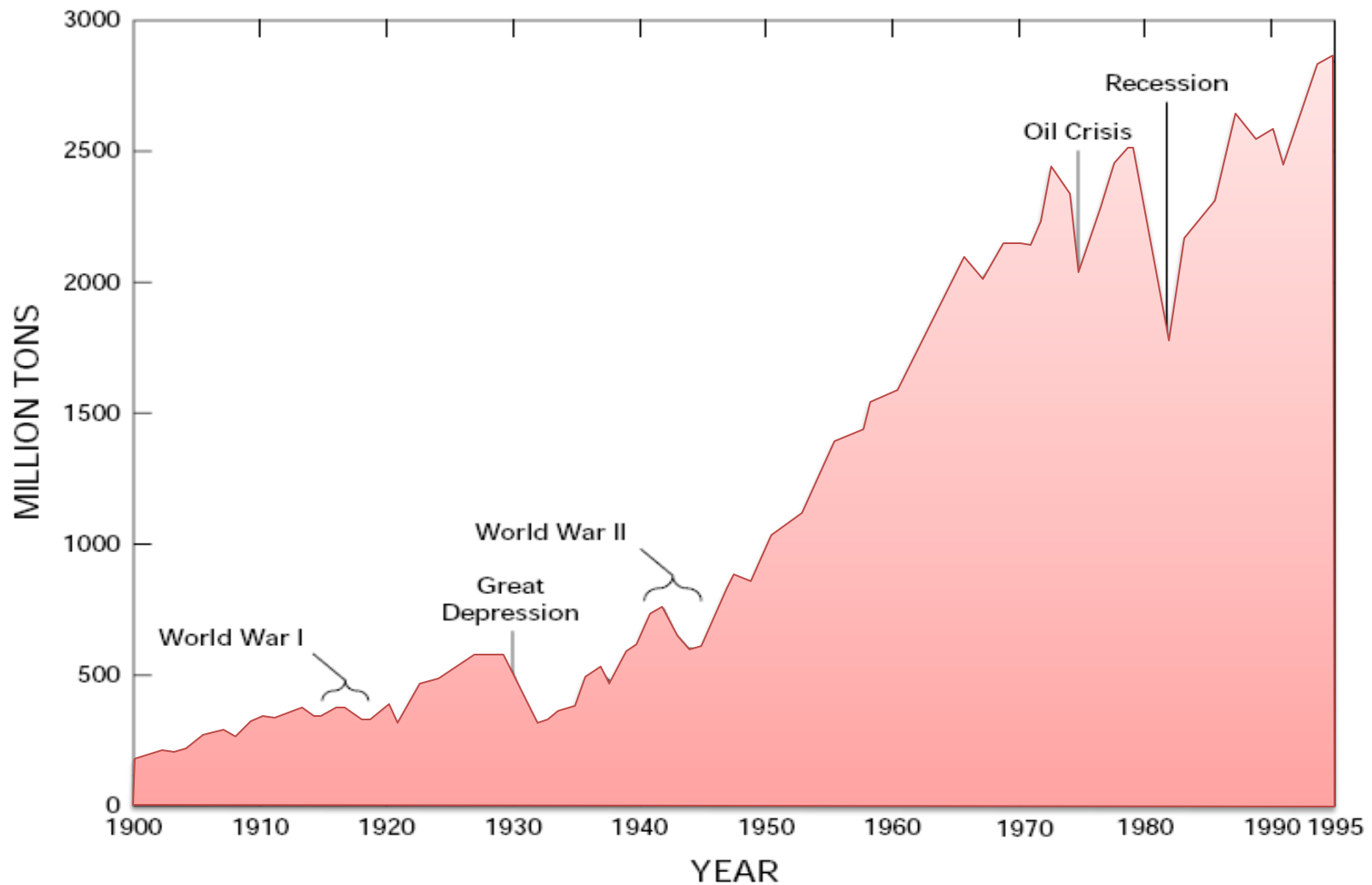


- 1) Consumption patterns
- 2) Greenhouse gas connection to materials
- 3) Role of materials management
- 4) Ways to reduce material-related greenhouse gases
  - a) Recycling
  - b) Extended producer responsibility
  - c) Limits of recycling
  - d) Product stewardship
  - e) Environmentally preferable purchasing
  - f) Consuming less
  - g) Government actions
  - h) Additional resources for local/state governments



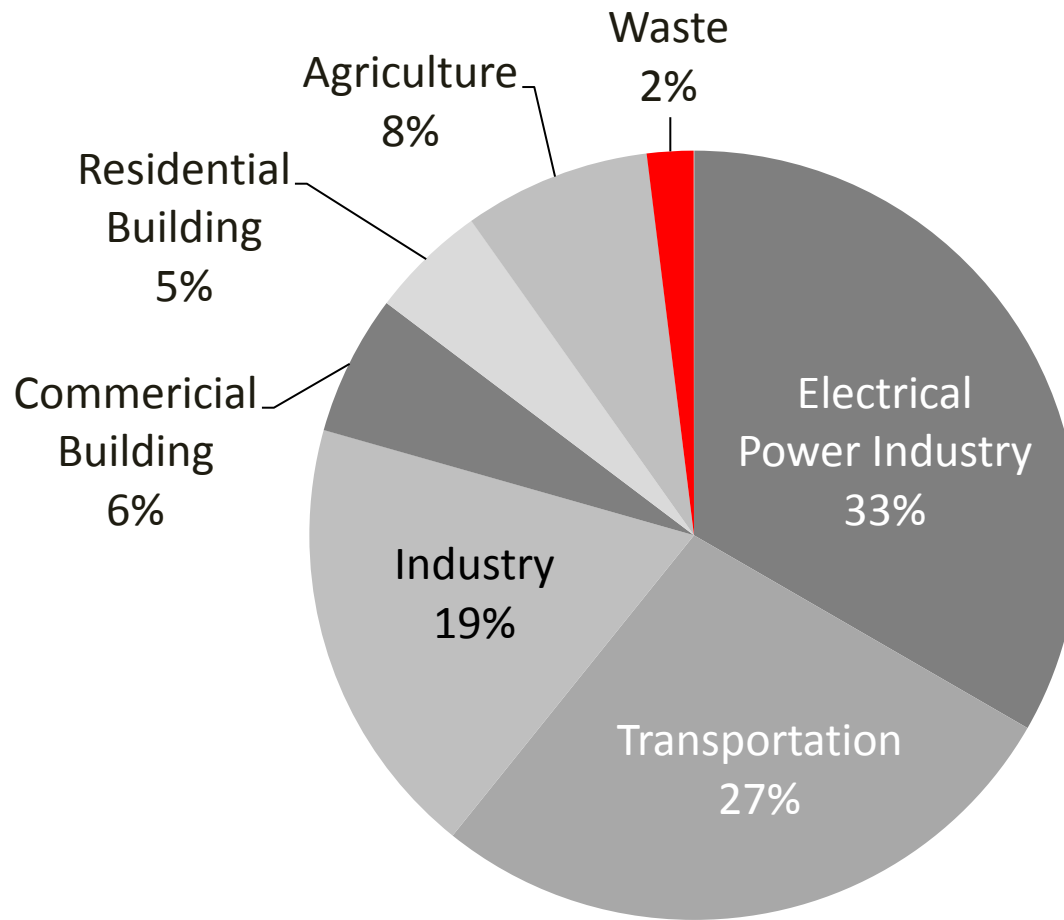


Define “materials”.



Use of materials in the United States, 1900-1995. Modified from Matos and Wagner, 1998, p. 110.

# Materials Consumption



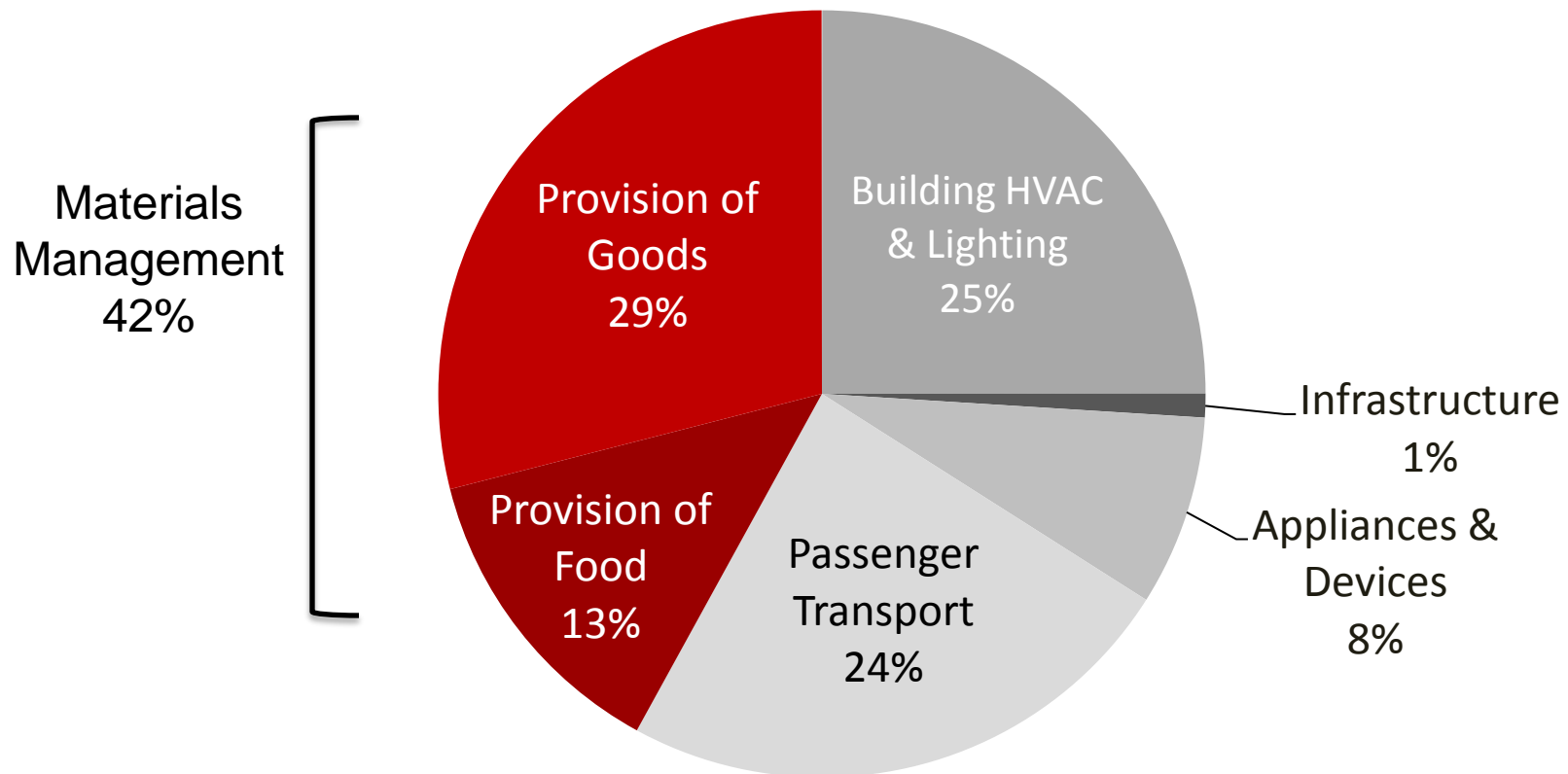
Source: U.S. Inventory of GHG Emissions and Sinks : 1990-2006 (US EPA, 2008)

# US Greenhouse Gas Emissions (2006)



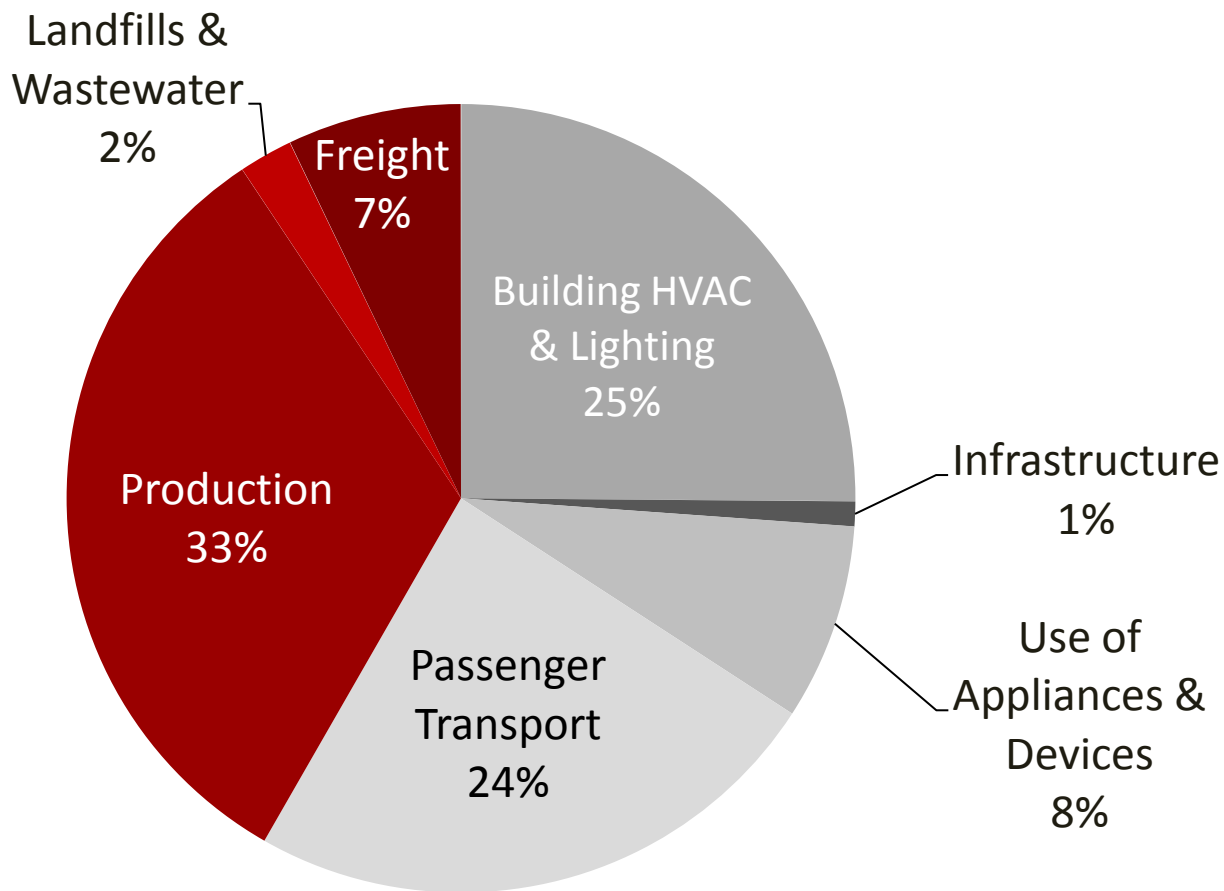
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# US Greenhouse Gas Emissions (2006)



Source: *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. EPA.

# US Greenhouse Gas Emissions (2006)



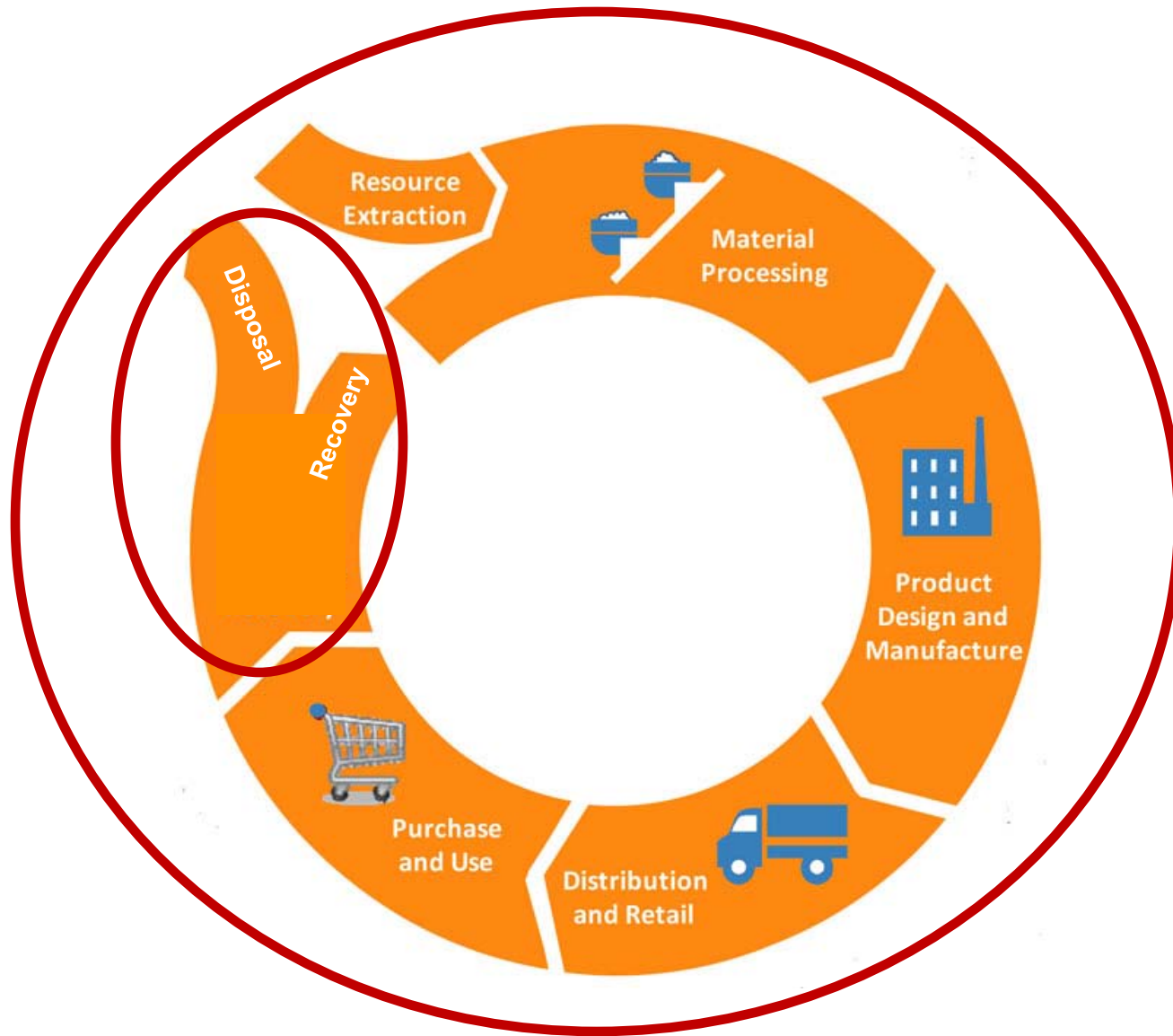
Source: *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. EPA

# Materials: Production Dominates Emissions

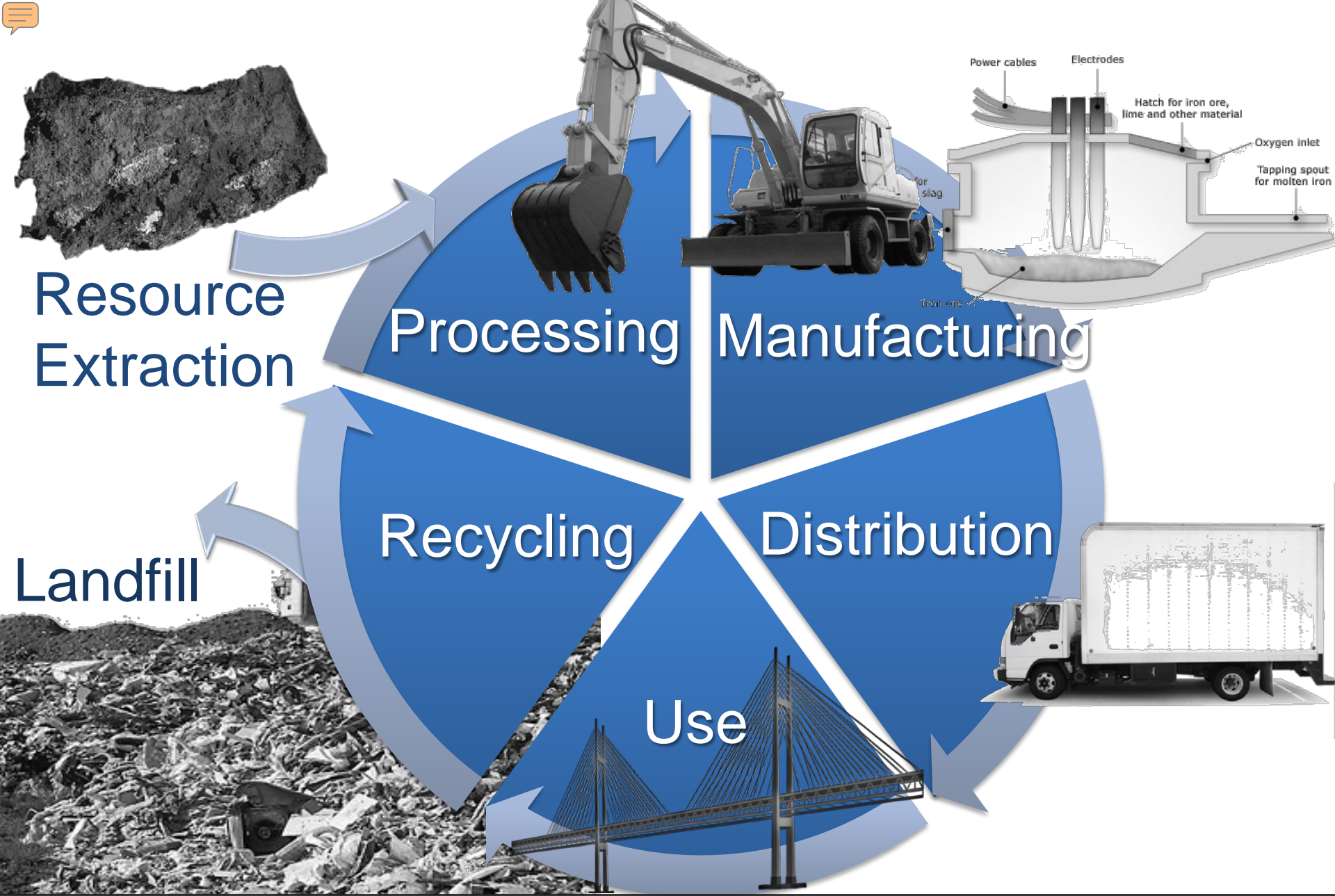




# WASTE management vs. MATERIALS management



Product Lifecycle



Lifecycle of Steel



*“Materials management is an approach to using and reusing resources most efficiently and sustainably throughout their lifecycles. It seeks to minimize materials used and all associated environmental impacts.”*

- From EPA, [Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices \(PDF\)](#) (98pp, 1.5MB)

## Materials Management: A Working Definition

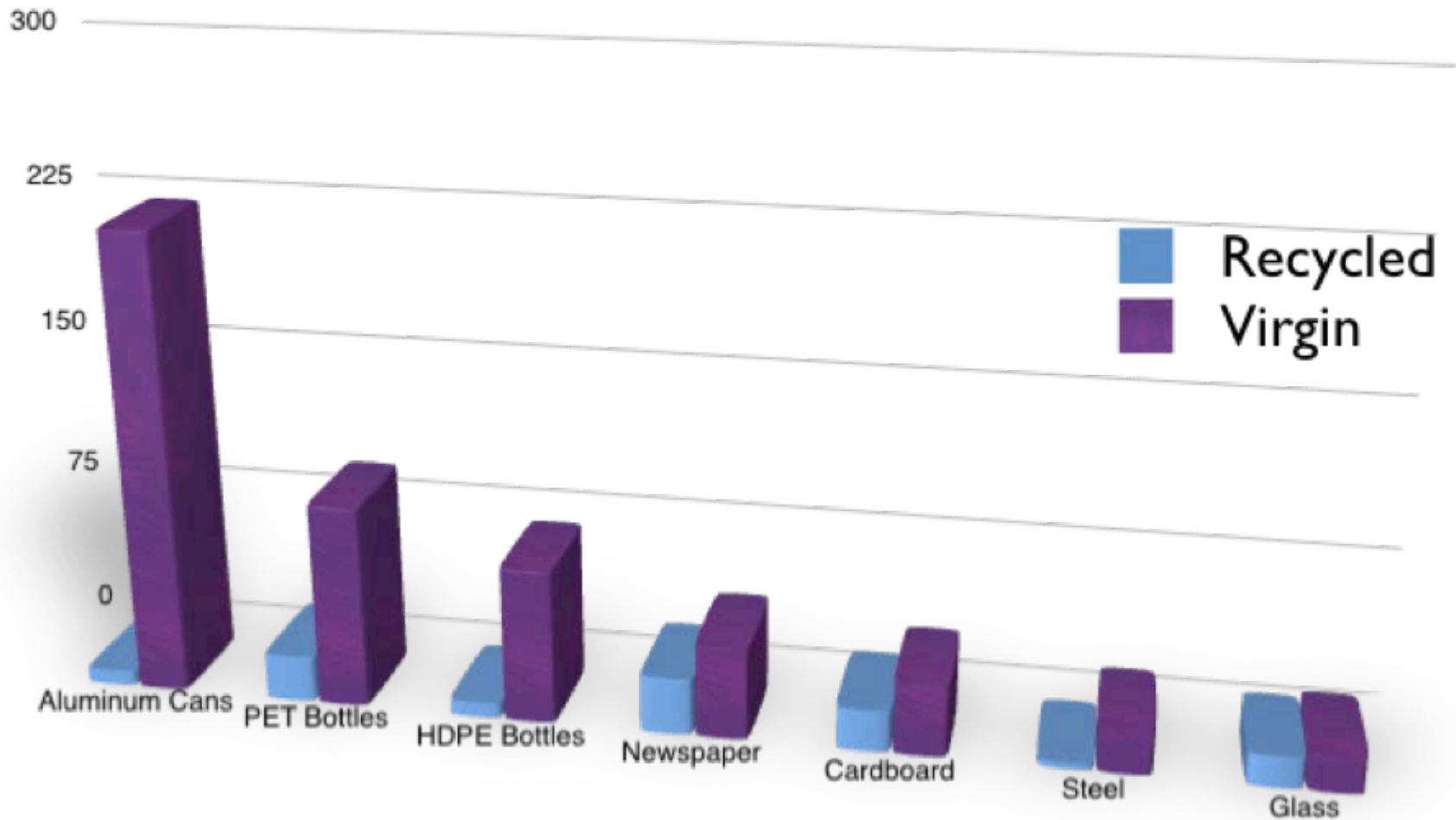


# Reducing the Impacts of Our Consumption

Photo credit: flickr Nick Bramhall, licensed under Creative Commons Attribution-Non-Commercial 2.0 license



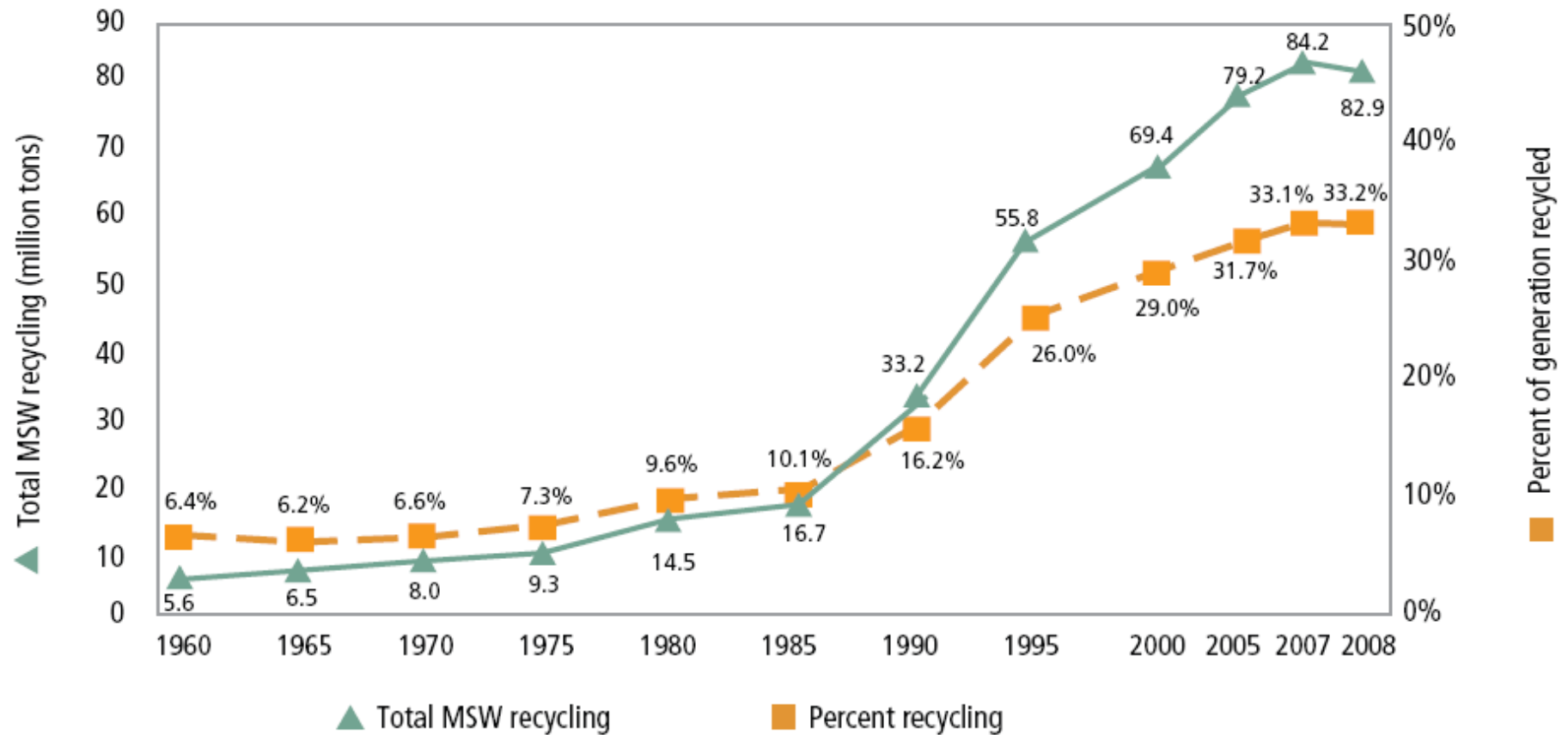
## Energy Use: Recycled vs. Virgin Content Products (million BTUs/ ton)



Recycling Conserves Energy

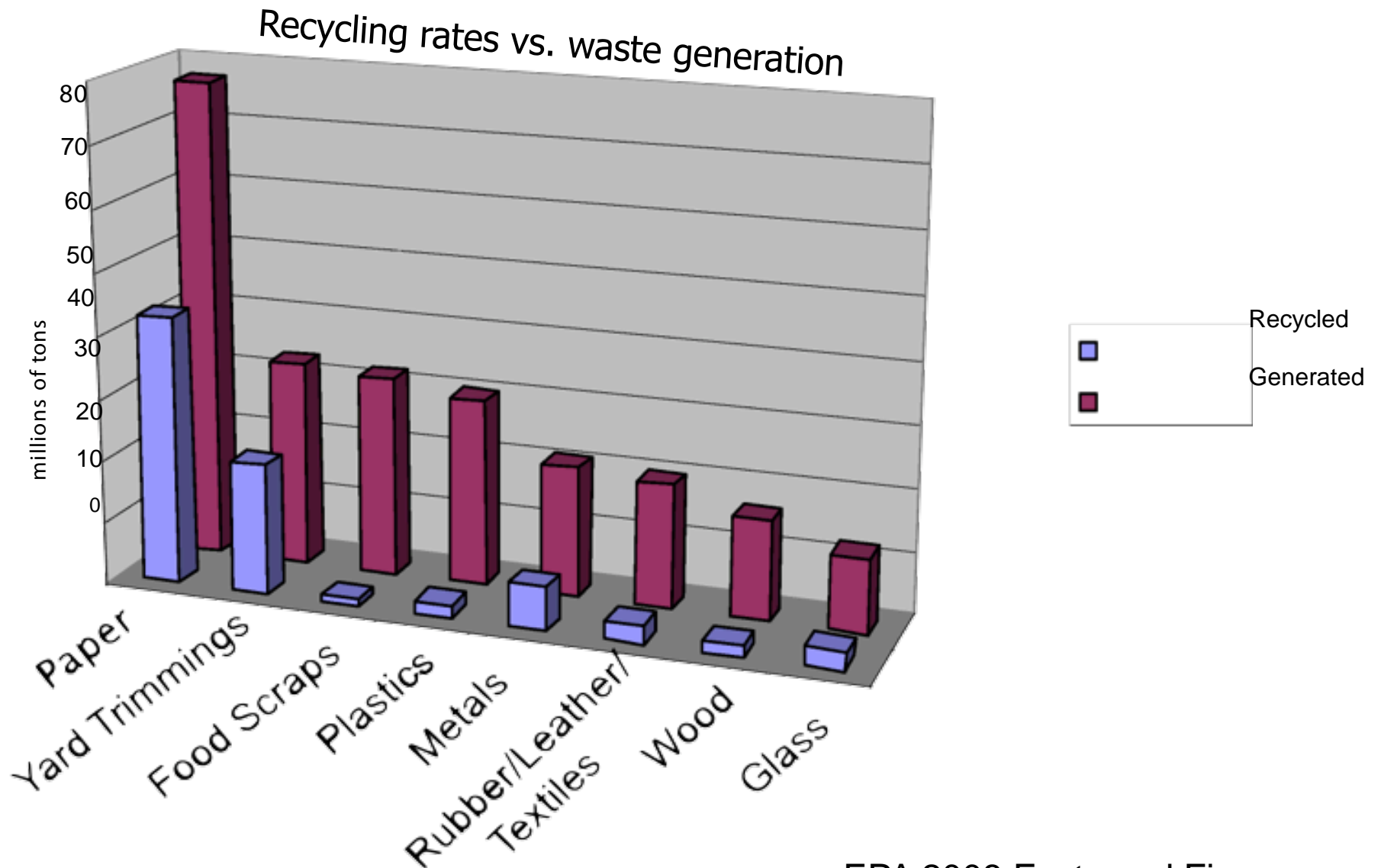


Figure 2. MSW Recycling Rates, 1960 to 2008



Recycling Rates





EPA 2008 Facts and Figures

# Recycling vs. Waste Generation



39 million  
cars off the road



22 million  
homes heated/  
year



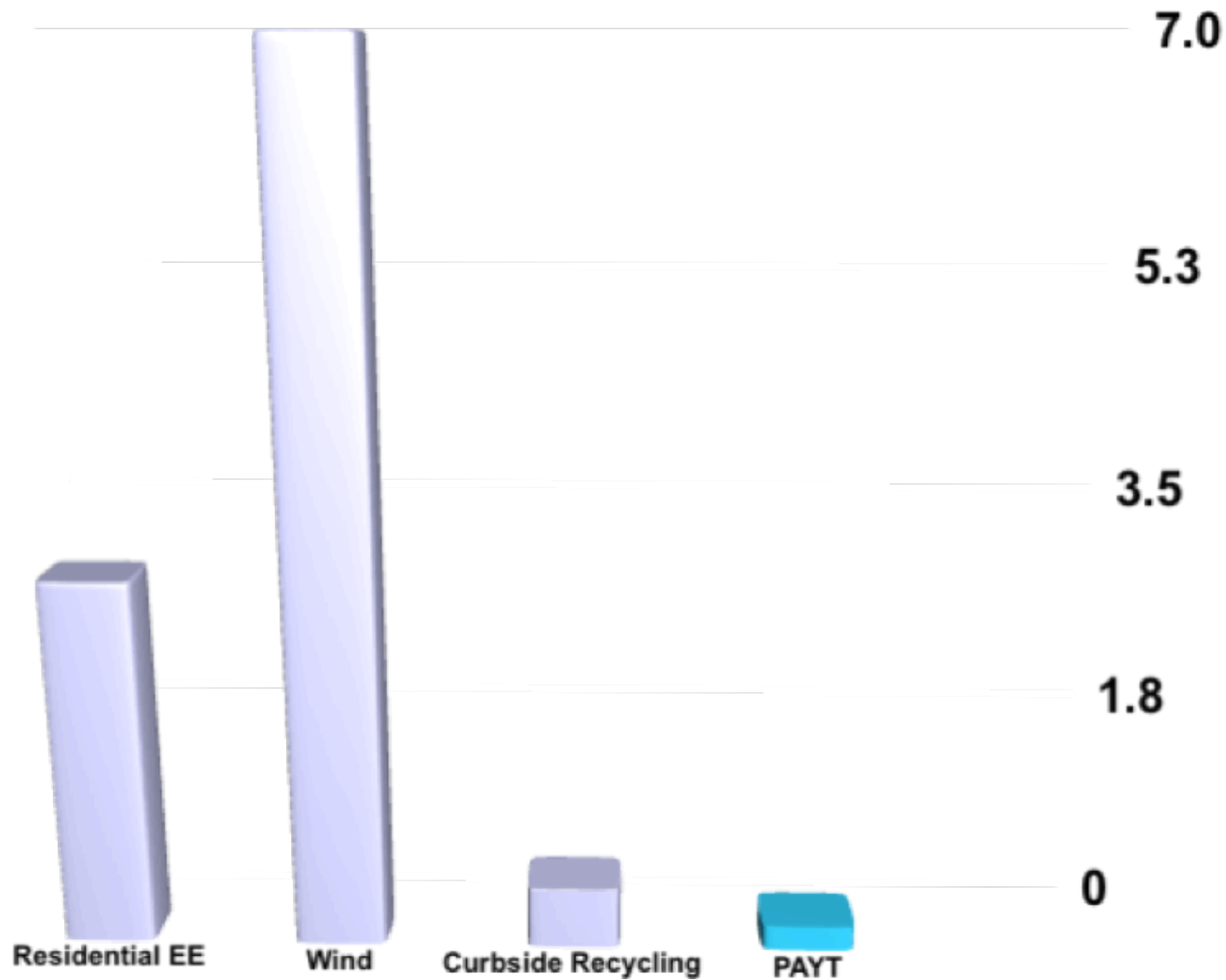
50  
power plants  
avoided



400 million  
barrels of oil  
conserved

Impacts from Recycling Rate (33%)





Cost effectiveness of GHG reduction strategies

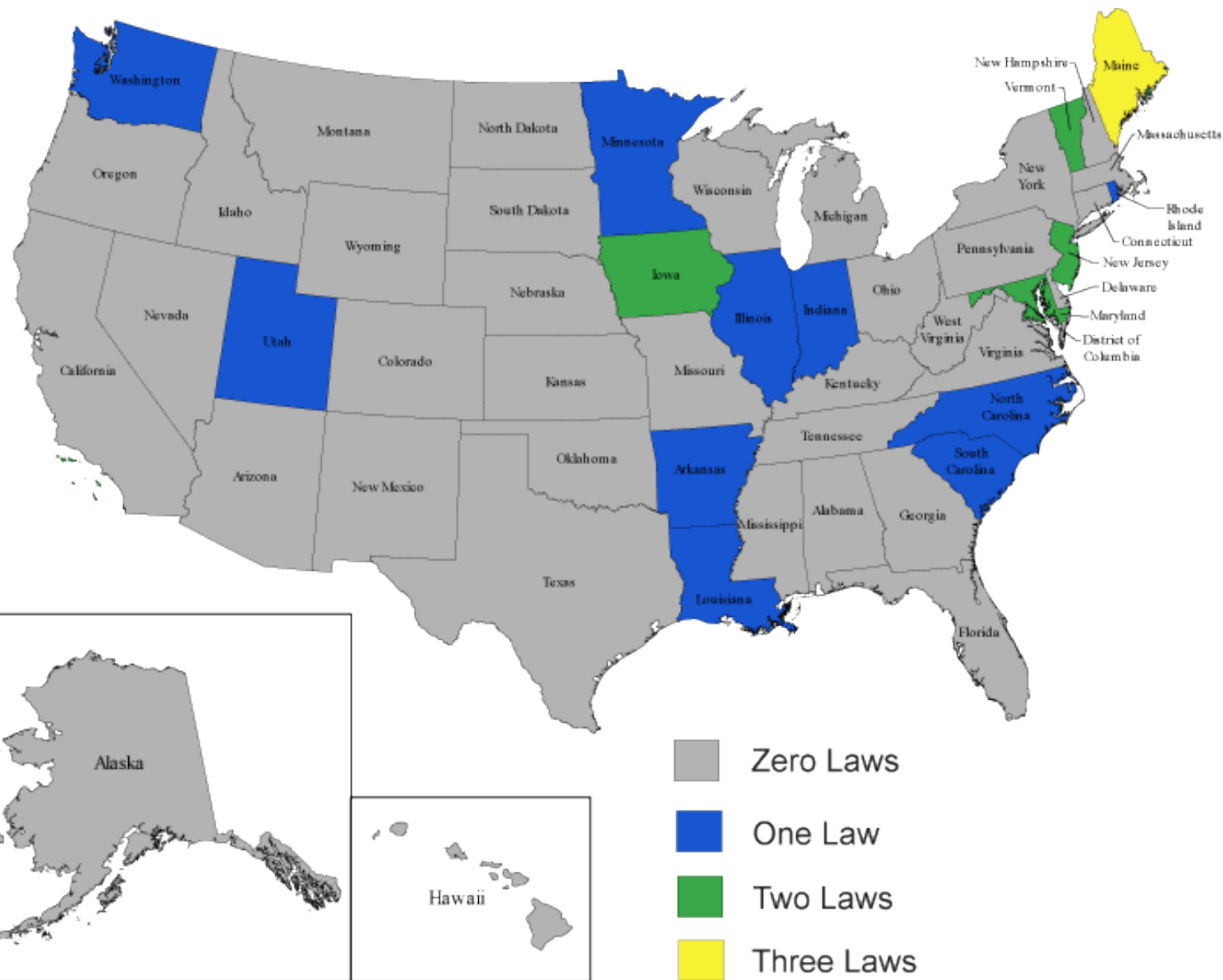


**EPSON got to zero waste**  
**\$300,000 saved**



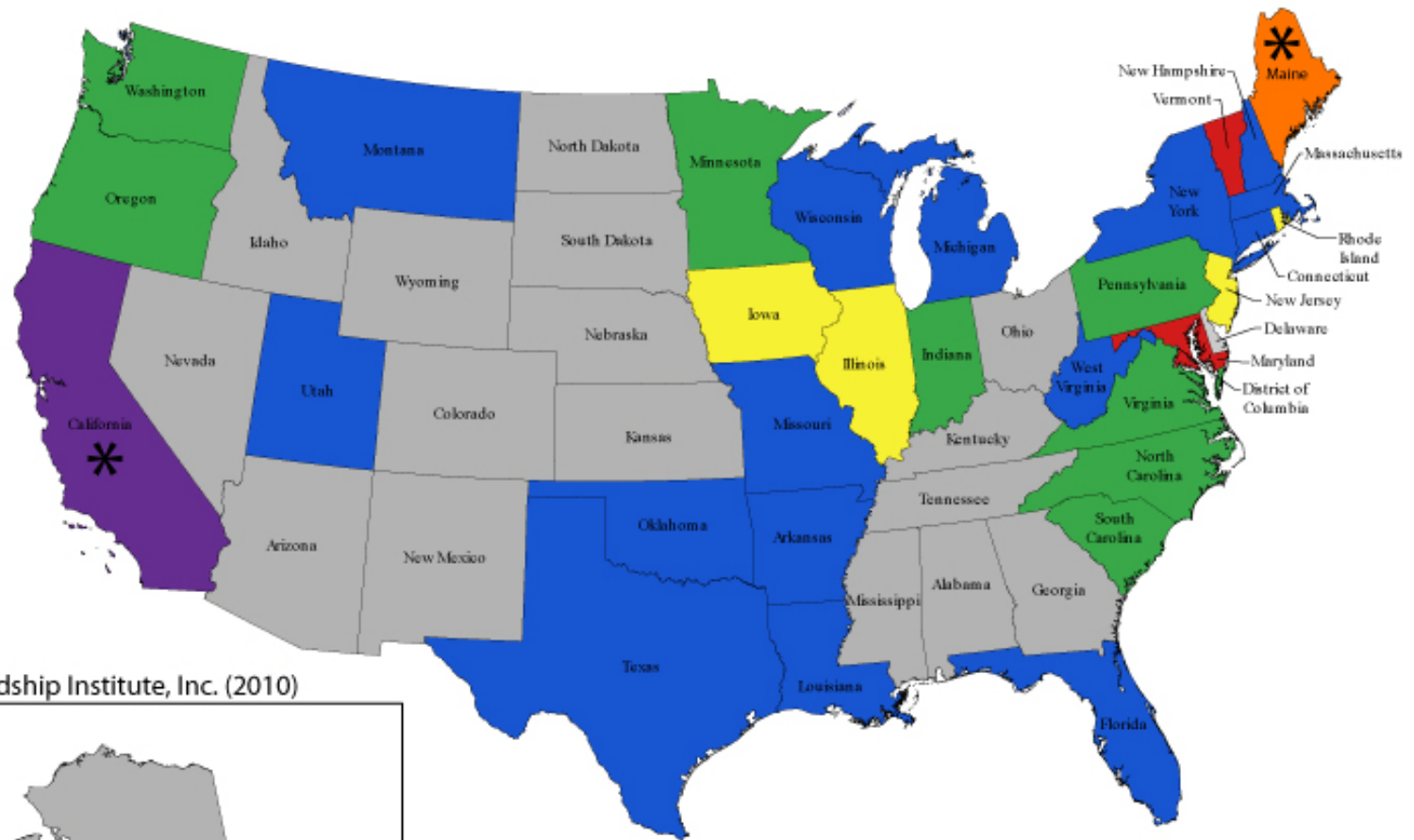
**HP eliminated 90% of waste**  
**\$870,564 saved**





# Extended Producer Responsibility Laws 2006

- Auto Switches
- Batteries
- Carpet
- Cell Phones
- Electronics
- Fluorescent Lighting
- Mercury Thermostats
- Paint
- Pesticide Containers



Source: Product Stewardship Institute, Inc. (2010)



Number of Product Categories Covered by EPR Law

Zero
  One
  Two
  Six

Three
  Four
  Five

\* Other laws authorizing agencies to require EPR, including Framework laws.

# Extended Producer Responsibility Laws 2010



Jobs

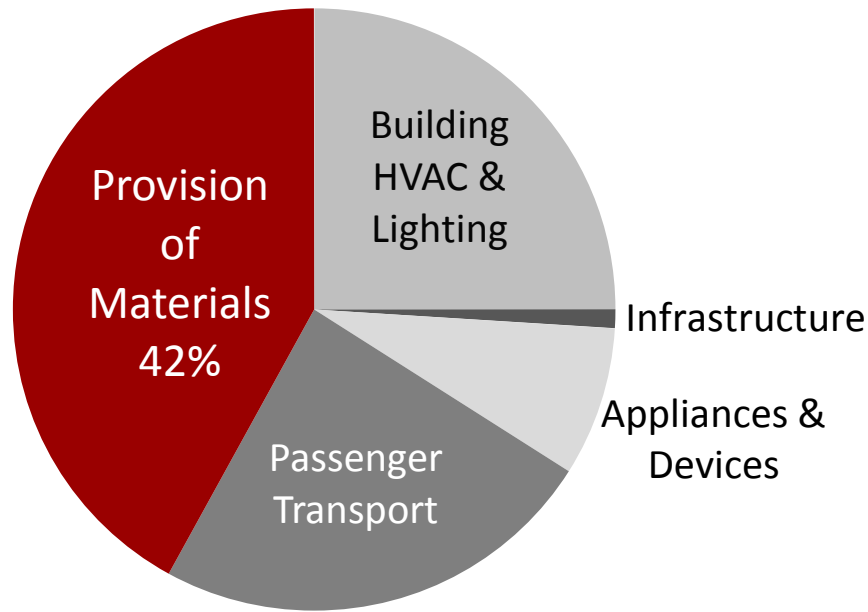


Increase to 100% recycling nationally yields:

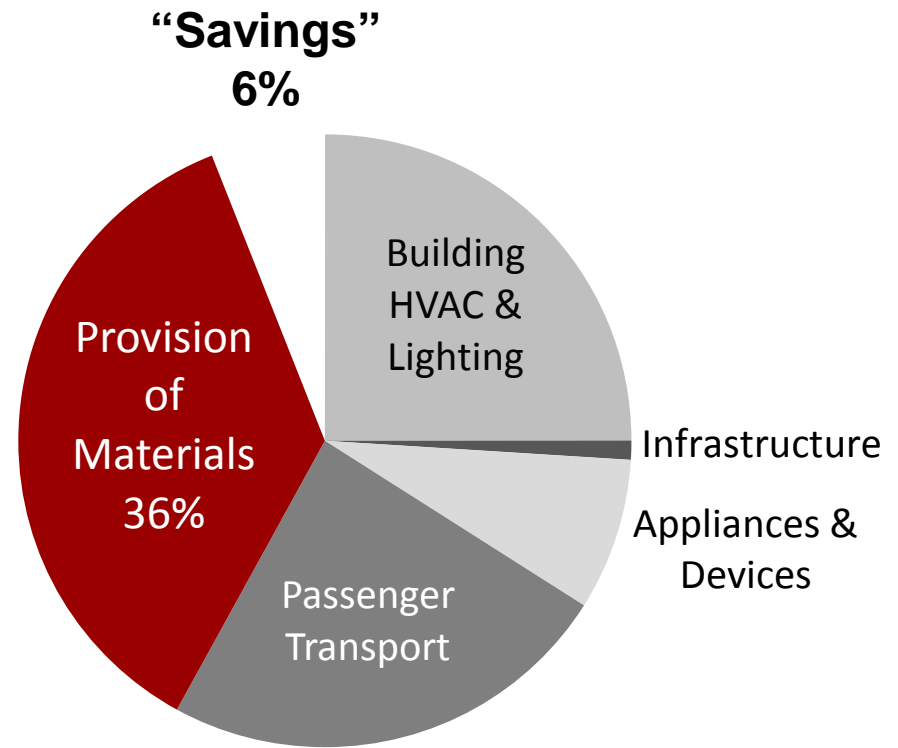
- 450 million metric tons of greenhouse gas reductions per year
- Includes all municipal solid waste MSW and construction, remodel, and demolition debris.



GHG Reduction Potential



2006 U.S. GHG inventory  
with 32% recovery  
(municipal solid waste)



2006 U.S. GHG inventory with  
hypothetical recovery rate  
(~100% municipal solid waste + construction and  
demolition debris)

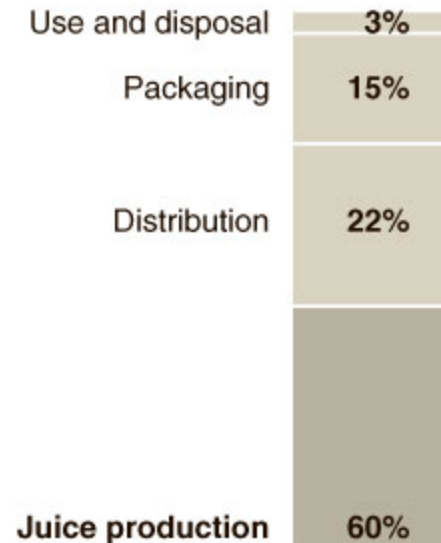
# Limitations of Recycling and Composting



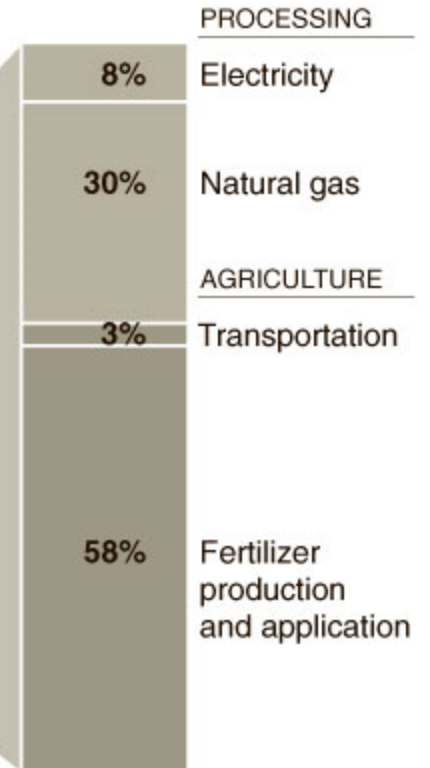


## Sources of carbon dioxide emissions

### THROUGHOUT PRODUCT LIFE CYCLE



### DURING JUICE PRODUCTION\*



\*Percentages do not total 100 percent, because of rounding.

Source: Tropicana

THE NEW YORK TIMES

# Product Stewardship

## Tropicana Orange Juice





**greenhouse gas emissions**



**water consumption**



**recycled content**



**energy efficiency**



EPA Resources:

- Electronic purchasing: <http://www.epa.gov/epp/pubs/products/epeat/index.htm>
- Recycled content purchasing: [http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon_home.html)

**Environmentally Preferable Purchasing**



120

100

80

60

40

20

0

**Plastic bottle,  
disposed**

**Plastic bottle,  
recycled**

**Tap water,  
reusable bottle**

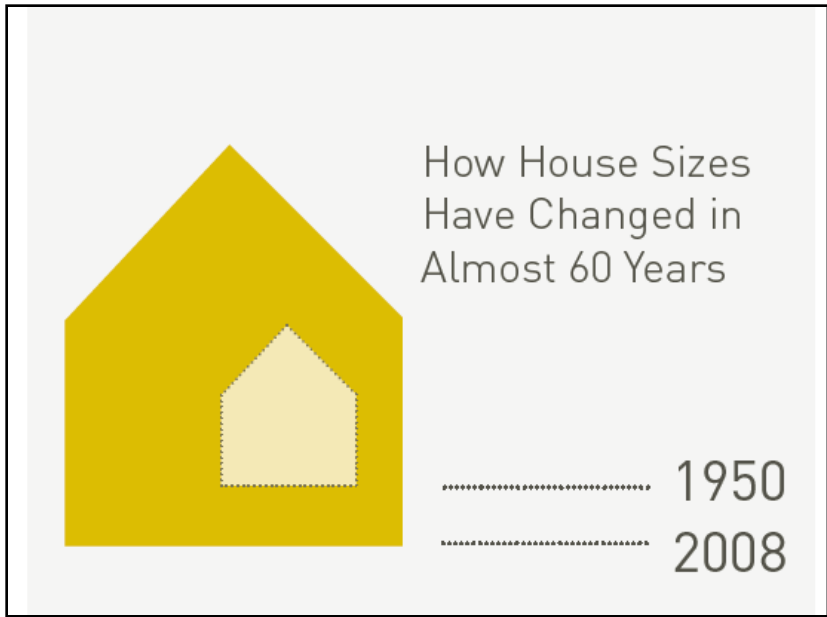
Relative greenhouse gas emissions of water consumption options

# Water Consumption



Shipping bags – even if made from virgin resources and not recycled – have lower environmental burdens in most categories than cardboard boxes – even if the boxes contain high levels of recycled content.

# Packaging



YEAR	HOME SIZE	FAMILY SIZE	SQ. FT. PER PERSON
1950	983	3.8	258.7
2008	2500	2.6	961.5

# Building Materials



Design for Deconstruction



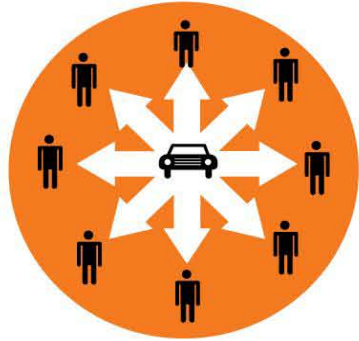


# Reduced Consumption

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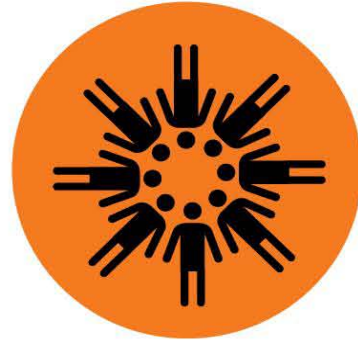
Collaborative Consumption



PRODUCT SERVICE SYSTEMS



REDISTRIBUTION MARKETS



COLLABORATIVE LIFESTYLES

# Collaborative Consumption

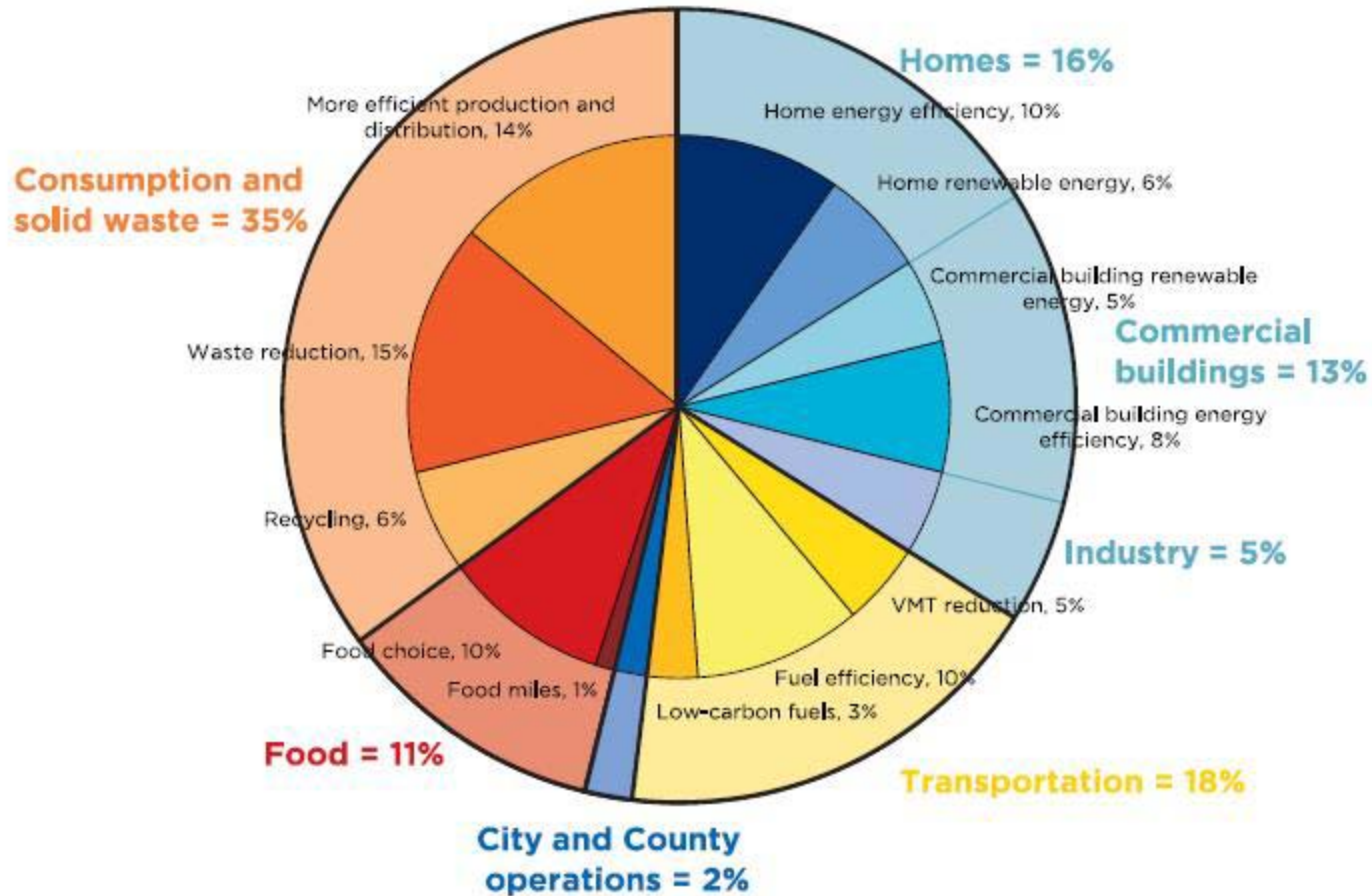




Lending Libraries

# CLIMATE ACTION PLAN

(APPROXIMATE CONTRIBUTION TO 2030 EMISSION-REDUCTION GOAL)



## State and Local Government Actions



# State and Local Government Actions

Photo credit: flickr kate\*, licensed under Creative Commons Attribution-Non-Commercial 2.0 license



**PROCUREMENT**



**SPECIFICATIONS**



**LABELING**



**FOOTPRINTING**

State and Local Government Actions





- Discussion
- Recent Changes
- Manage Wiki

Search 

- Home Page
- We Want to Hear from You
- Background & Motivation
- Greenhouse Gas Inventories
- Setting Targets
- Climate Protection Actions
- Measuring Results
- Resources
- Glossary
- Acknowledgements

## Our Purpose - Reducing Greenhouse Gases through Materials Management

Materials Management strategies reduce greenhouse gas (GHG) emissions associated with waste, materials and products through a lifecycle and systems approach.

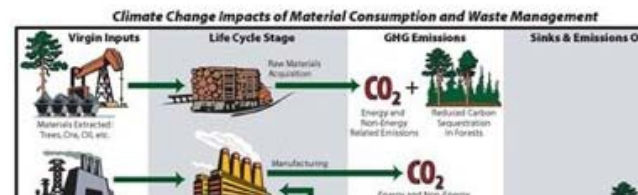
This wiki is a materials management toolkit of:

- Climate Protection Actions
- Example Climate Action Plans
- New approaches to GHG Inventories
- Measurement Tools
- Links to resources
- And more...see links at left

[We want to hear from you.](#) This beta version toolkit was launched on 9/8/10. Help us improve it with your feedback. Let us know what materials management approaches you are adding to your Climate Action Plan.

## Who Should Use This Toolkit

- State and Local Government Climate Change Staff
- Recycling, Composting and Solid Waste Professionals

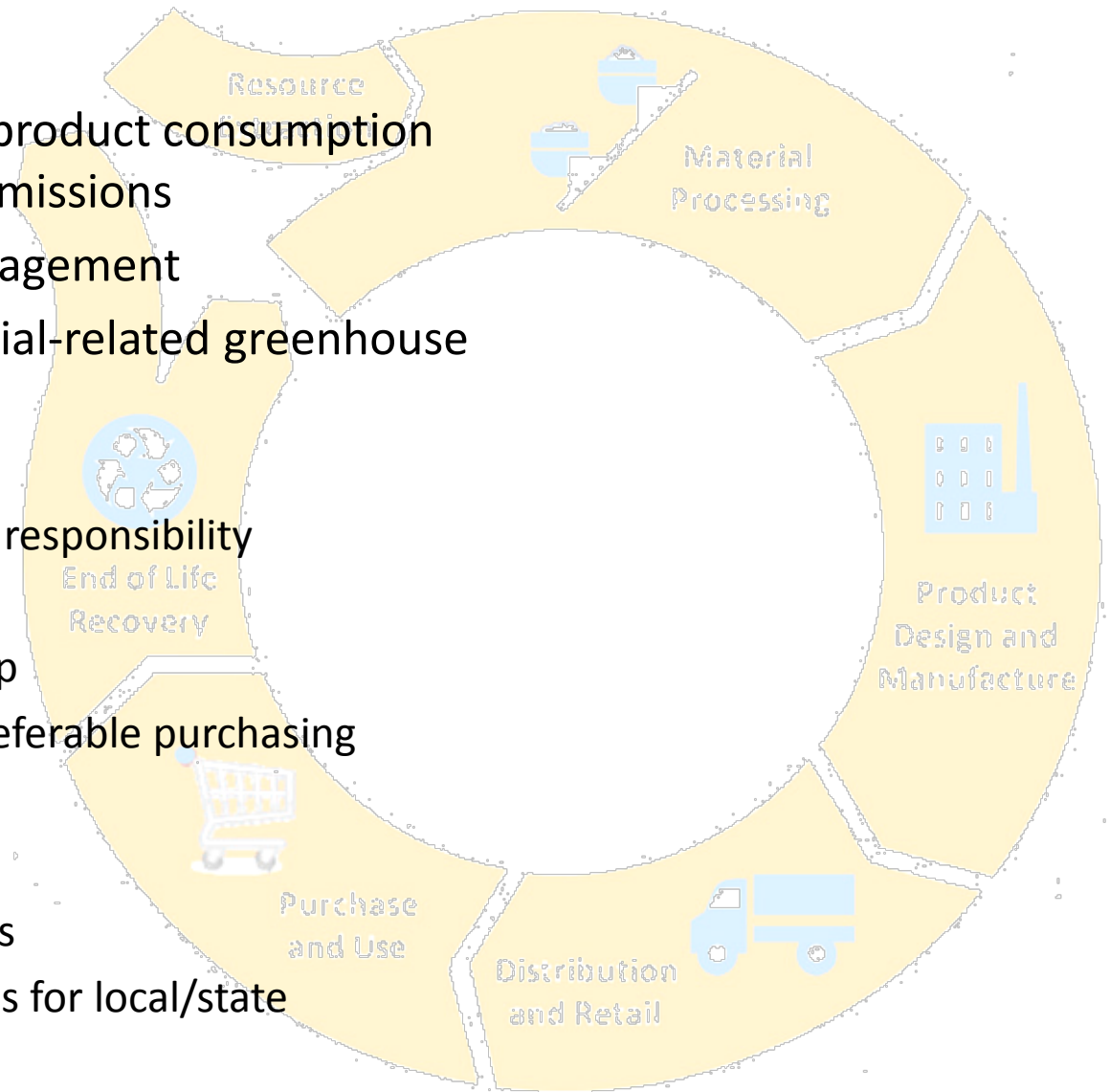


[www.captoolkit.wikispaces.com](http://www.captoolkit.wikispaces.com)

Tools and Resources



- 1) Connection between product consumption and greenhouse gas emissions
- 2) Role of materials management
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Saskia van Gendt  
Vangendt.Saskia@epa.gov,  
415-947-4103

We welcome your feedback and ideas.